

Efficacy of Proprioceptive Neuromuscular Facilitation Technique with Low-Frequency Electrical Stimulation on Facial Disability in Bell's Palsy

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Abstract

Introduction: Bell's palsy is a unilateral weakness or paralysis of the face due to acute peripheral facial nerve dysfunction with no identifiable cause. Peripheral facial palsy is the most frequent cranial neuropathy and can originate from various kinds of damage to the VII cranial nerve. The study aims to determine the effectiveness of the proprioceptive neuromuscular facilitation technique on facial disability in rehabilitation of Bell's palsy. It also analyses the effectiveness of hold-relax technique between the two experimental groups.

Materials and Methods: This comparative study setup is at VAPMS College of Physiotherapy and KGH Visakhapatnam. A study sample of 20 subjects was selected based on inclusion and exclusion criteria. The subjects are randomly allocated into two groups through random sampling method, an experimental group-1 (n=10) received electrical stimulation and facial exercises, and experimental group-2 (n=10) received PNF (hold-relax) technique and electrical stimulation for three weeks (12 sessions) for 30-40 minutes. The subjects' assessment is done using outcome measures of Sunny Brook Facial Grading Scale.

Results: The results show that there is no significant difference between the groups means value of Experimental Group 1 is 57.60, the mean value of experimental group 2 is 60.80, the p-value is 0.2915, and the t-value is 1.0866, which is not statistically significant.

Conclusion: This study concludes that improvement was seen in both groups. PNF with electrical stimulation is slightly more effective than conservative therapy with electrical stimulation. As there is no significant difference according to statistical analysis both the treatments are recommended.

Keywords: Bell's palsy; Electrical stimulation; Sunny Brook facial grading scale

Introduction

Bell's palsy is a unilateral weakness or paralysis of the face due to acute peripheral facial dysfunction with no identifiable cause with some recovery of function within 6 months [1]. It is an acute disorder of the facial nerve, the lower motor neuron lesion in origin may begin with symptoms of pain in the mastoid region and produce total or partial paralysis of movement of one side of the face [2]. The onset of Bell's palsy is sudden and usually during a period of 1-7 days, reaching maximum weakness up to 1-3 weeks after onset [8]. Secondary defects include the disappearance of facial creases, nasolabial fold, the forehead unfurrows and the corner of the mouth drops. The eyelids will not close and the lower lid sags, on attempted closure, the eye rolls upwards [Bell's phenomenon] [3].

There are several functional therapies available to deal with Bell's palsy. Proprioceptive Neuromuscular Facilitation has literature supporting that it is more effective than conventional therapy. Bell's palsy is managed by the HOLD-RELAX technique which is a stretching technique in proprioceptive neuromuscular facilitation which involves putting a muscle in a stretched position and holding for a few seconds, contracting the muscle without actually moving such as pushing gently against the stretch without actually moving, relaxing the stretch, and then stretching again while relaxing the second stretch should be deeper than the first stretch. The aim of the study is to prove the effectiveness of the hold-relax technique in Bell's palsy compared to conventional therapy. The results of the study provide an effective and reliable treatment programme.

Materials and Methodology

A total of 20 Bell's palsy adults were recruited in this study. In this study, 20 subjects are taken in which they're divided into 2 groups Group A and Group B. In group A 10 subjects are trained with electrical stimulation and facial exercises for 3 weeks 12 sessions. In group B 10 subjects are trained with PNF [HOLD-RELAX] technique and electrical stimulation for 3 weeks 12 sessions. The subjects are first assessed by using the Sunny Brook Facial Grading Scale. The technique is applied to individual muscles in order to know the improvement of individual muscles. The voluntary movements of the muscle are assessed before the treatment is started.

Forehead wrinkles (Frontalis)

The subject is asked to raise their eyebrows. The vertical displacement of the paralyzed side is compared to the unaffected side.

Gentle eye closure (Orbicularis Oris)

The distance between the upper and lower eyelids is compared between the paralyzed side and the unaffected side.

Open-mouth smile (zygomaticus and risorius)

The amount of commissure excursion from the resting position to the maximal smile on the paralyzed side was compared to that of the normal side.

Snarl (Levator labii alaeque nasi and Levator labii superioris muscle)

The amount of excursion from the resting position to maximal snarl on the paralyzed side compared to the normal side.

Lip pucker (zygomaticus and risorius)

The amount of medial displacement from the resting position to maximal puckering on the paralyzed side is compared to the normal side.

Methodology of Hold-Relax Technique [Individual Muscles]

Frontalis

Ask the patient to lift the eyebrows up, look surprised and wrinkle the forehead. Apply resistance to the forehead pushing caudally and medially. This motion works with eye-opening and is reinforced with neck extension.

Corrugator Supercilii

Ask the patient to frown on the eyebrows- Apply resistance just above the eyebrows diagonally in a cranial and lateral direction. This motion works with eye closing.

Orbicularis oculi

Ask the patient to close the eyes—separate exercise for upper and lower eyelids. Avoid putting pressure on the eyeballs.

Procerus

Ask the patient to wrinkle the nose- Apply resistance to the nose diagonally down and out. This muscle works with a muscle corrugator with eye closing.

Orbicularis Oris

Ask the patient to purse the lips whistle and say prunes- Apply resistance laterally and upward to the upper lip and downward to the lower lip.

Mentalis

Ask the patient to wrinkle the chin- Apply resistance down and out of the chin.

Outcome measures

Mobility function was measured by using the Sunny Brook facial grading scale.

Sunny Brook Facial Grading Scale

Voluntary movement in “*SUNNY BROOK FACIAL GRADING SCALE*” is graded by Degree of muscle excursion compared to normal side by assessing the standard expressions and categorised movements done by patients like Unable to initiate movement, Initiates Slight movement, Initiates movement with mild excursion, movement almost complete and

Movement complete. And the score is given between 1-5 i.e., from unable to initiate the movement to completing the movement. Assessment of voluntary movements starts from A brow lift, Gentle eye closure, Open mouth smile, Snarl and Lip pucker.

Resting symmetry of the face describes the facial features without any voluntary movement. Resting symmetry refers to a complete match in size, location, shape and arrangement of each facial component about the sagittal plane. That is asymmetry refers to the bilateral difference between such components.

The most affected component of resting symmetry in Bell's palsy is the absence of nasolabial fold, drooping of corners of the mouth, and narrow eyes. These are the most commonly affected components among the subjects taken. These components are improved in both experimental group 1 and experimental group 2 because of repeated activities.

The most commonly affected component of voluntary movement is raising the eyebrows, gentle closure of eyes and open mouth smile. Excursion of the mouth is seen when the patient smiles. These are the affected components of voluntary movement in patients with Bell's palsy. Both experimental group 1 and experimental group 2 showed improvement because of repeated activities. Lip pucker-

ering was less improved among all the findings demonstrating that puckering and blowing movements in people with facial movement disorders differ in a manner that is consistent with differences found in people who are healthy.

Sunny Brook facial grading scale is a comprehensive scale for the evaluation of facial paralysis patients. Its results greatly depend on subjective inputs.

Synkinesis in "*SUNNYBROOK FACIAL GRADING SCALE*" is graded by comparing voluntary movement with standard expressions on the normal side. It is categorised as None is no synkinesis or mass movement, Mild is slight synkinesis of one or more muscles, Moderate that is obvious synkinesis of one or more muscles. Severe that is disfiguring synkinesis/ gross mass movement of severe muscles. The score is given between 0-3 which is from mild to severe. Factors used to assess synkinesis are the same factors which are used to assess voluntary movement.

Interventions

Experimental group-1

In this group, 10 subjects are taken and are trained with electrical stimulation and facial exercises such as inflating the balloon and holding the air in the cheeks, raising the eyebrows, pouting of lips, closure of eyes and snarling for 3 weeks 12 sessions. And are assessed by the Sunny Brook facial grading scale.

Experimental group-2

In this group 10 subjects are taken and trained with electrical stimulation and PNF techniques mainly HOLD-RELAX technique is used in this study. The technique is applied to individual muscles. The patient is asked to perform the movement of the particular muscle and made to hold for 5-10 seconds the second the therapist will add some resistance and improve the movement and hold for 5-10 seconds. For example, if the Frontalis muscle must be trained patient is asked to raise the eyebrows and hold for 5-10 seconds the second time the patient raises the eyebrow the therapist adds some resistance and raises the eyebrow and holds for 5-10 seconds likewise its done to every muscle. The subjects in this group are trained for 3 weeks and 12 sessions.

Conventional physiotherapy

Both groups received conventional physiotherapy along with their respective training programs. It consists of stretching, facial manipulation and home exercises.

Results

Data were analysed using SPSS, and independent paired t-tests for the pre-test and post-test results of both the variables have been calculated. There is no significant difference between the groups mean value of Experimental group -1 is 57.60, the mean value of Experimental group 2 is 60.80, the p-value is 0.2915 and the t-value is 1.0866 which is statistically not significant.

	Mean±SD	t - value	p-value	p-value
Experimental Group-1	57.6±6.88	1.086	0.1457	>0.5
Experimental Group-2	60.700±5.83			

Experimental group-1/ Experimental group-2

Discussion

The study findings suggest the effectiveness of both electrical stimulation with facial exercises and electrical stimulation with hold relax technique in improving resting symmetry and voluntary movements in lower motor neuron bell's palsy [4]. The results of the present study show no significant difference between experimental group 1 and experimental group 2. Both the groups have equally shown improvement.

Hold relax technique is selected as all of the PNF techniques rely on stretching a muscle to its limit. Doing this triggers the inverse myotatic reflex, a protective reflex that calms the muscle to prevent injury [5]. It increases the range of motion of the muscles affected and helps to gain the muscle action back like it used to be before. It is recommended that PNF can be used as an adjective to electrical stimulation in improving facial symmetry and facial muscle function in persons with Bell's palsy [6].

PNF improves facial function by initiating voluntary effort via proprioceptive stimulation. It is a method of stretching muscles to maximize their flexibility that is performed by the therapist and involves a series of contractions and relaxations with enforced stretching during the relaxation phase [7]. As experimental group 2 is trained with PNF there is speedy recovery of Bell's palsy but both the groups showed equal improvement and there is no significant difference between the groups.

Voluntary movement in "*SUNNY BROOK FACIAL GRADING SCALE*" is graded by the degree of muscle excursion compared to the normal side by assessing the standard expressions and categorised movements done by patients like unable to initiate movement, initiating slight movement, initiating movements with slight excursion, initiates movements with mild excursion, movements almost complete and movement complete [9]. And the score is given between 1-5 i.e., from unable to initiate the movement to complete movement.

Conclusion

Bell's palsy is manifested due to various unknown causes [10]. This study shows the effectiveness of hold- relax technique and conventional therapy in improving facial symmetry. This study shows that both experimental group 1 and experimental group 2 showed significant improvement in resting symmetry and voluntary movement. The study concludes that both treatments are suggested for treating resting symmetry and voluntary movements in Bell's palsy.

The present study is carried out "*EFFICACY OF HOLD- RELAX TECHNIQUE IN BELL'S PALSY*". 20 subjects were taken for this study. A random sampling technique is used and the study was performed at the VAPMS College of Physiotherapy. In this study, 20 subjects are taken and divided into two groups. 10 in each group, both are experimental groups. Experimental group 1 was trained with conservative therapy along with facial exercises for 3 weeks 12 sessions daily. Experimental group 2 is trained with PNF along with electrical stimulation for 3 weeks 12 sessions daily.

The assessment was taken by using "*SUNNYBROOK FACIAL GRADING SCALE*" before and after the treatment. The improvement was seen in both the groups. So both the conservative treatment with electrical stimulation and PNF training with electrical stimulation are recommended. PNF with electrical stimulation is slightly more effective than conservative therapy with electrical stimulation. As there is no significant difference according to statistical analysis both the treatments are recommended.

Limitations and Suggestions

The size of the sample was small in both groups. Further research with a larger sample must be conducted. No measures of impairment were taken in this study because the purpose of this study was to determine improvement in functions that are meaningful to the patients and their families. The age group taken in this study was 20-50. further research beyond 50 and below 20 including both males and females must be conducted. Further studies with a larger sample and longer post-intervention follow-up are necessary to document the long-term effects of participation in training Bell's palsy in the population.

Author's Contribution

First and second author have contributed in conception and design of the work, other author's have contributed in data collection and supervising the treatment protocol. Draft analysis and interpretation of the data was done by third and fourth author, final revision of article was done by all.

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